

REMARKS

Claim 1 has been revised to specify that it is directed to a formation method of a source or a drain contact of a field-effect transistor that includes a layer of a Group III nitride semiconductor. The Examiner is directed to the discussion in the specification at pages 6 to 10 (the first embodiment of the invention), and Figs. 1 and 2 for support for the change. Claims 1 to 3 remain before the Examiner for consideration; claim 4 stands withdrawn.

The rejection of claims 1 to 3 under 35 USC 103 as unpatentable over Herner et al. '147 in view of Nakamura et al. '512, if applied to the claims as amended, is respectfully traversed.

It is submitted that there is no proper teaching or suggestion in the primary reference that forming a film containing Si and Ti on the surface of a layer of a group III nitride semiconductor, and then heat-treating the film and the semiconductor would permit diffusion of Si as a dopant in the semiconductor. The discussion of various dopants in the secondary reference does not establish that Si diffuses as a dopant in a semiconductor layer.

Moreover, Herner et al. '147 at [0010], lines 2 and 3, discloses that titanium silicate formed in accordance with the process of that reference is formed in a very narrow region having a line width less than 3 μm . In contrast, the instant method is directed to formation of a source or drain contact of a field-effect transistor, including a Group III nitride semiconductor layer, which provides a wide region, normally at least 10 μm (and up to 100 μm) wide.

In addition, Herner et al. at [0053] describes annealing a wafer once at 600° C, followed by a second annealing at 800° C (see paragraph [0057]). Using such a process, it is difficult to

form a low-resistivity C54 phase with high uniformity in a wide region, which means that it is applied to only a very small contact, as confirmed by the statement in [0010], mentioned above. The instant invention is a distinct improvement over such a treatment.

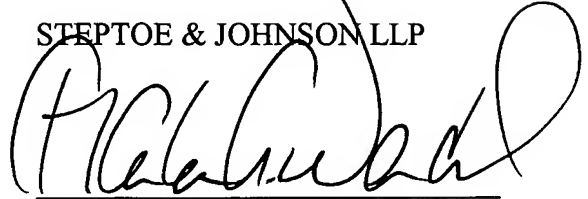
Nakamura et al. '512 describes the use of Si as a dopant, but, as indicated above, there is no suggestion that Si is diffused as required in the present claims, a technique certainly not disclosed in the primary reference. In addition, Si cannot be materialized unless it is doped as a dopant when forming an epitaxial layer, in which case the Si concentration is only about $10^{20}/\text{cm}^3$ at most. Should the concentration become too high, not only the Ga site in crystalline acting as an n-type dopant, but also Si, enters into an N-site, and they act as a p-type dopant. Therefore, excessive doping of Si makes it extremely difficult to remove excess Si. In the present invention, Si generated in excess is removed by forming the titanium silicate. In addition, when an SiN compound is liable to be formed in those instances where Si is generated excessively inside the nitride semiconductor, when operating in accordance with the present invention, N generated upon high-temperature annealing reacts with Ti to prevent SiN from forming in advance. Nakamura et al. '512 calls for the desired amount of Si to be doped previously in the nitride semiconductor to form an n-type. Accordingly, the claims patentably define over the cited art.

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Reconsideration of the application is earnestly solicited.

Respectfully submitted,

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A large, stylized handwritten signature in black ink, likely belonging to Charles A. Wendel, is written over the firm name and extends across the signature line.

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